TWC'S RESPONSES TO QUESTIONS ON CABLE SYSTEM CAPACITY AND RETRANSMISSION-CONSENT AGREEMENTS

As explained below, TWC has entered into numerous retransmission-consent agreements concerning carriage of high definition ("HDTV") and other digital broadcast signals. Requiring immediate carriage of all digital broadcast signals during the transition to digital broadcasting, however, would cause significant and unnecessary hardship. Both because the marketplace is working and because consumers would be harmed by compelled carriage, regulatory intervention at this time would be inappropriate.

Background.

Cable-television systems transmit radio frequency (RF) signals through coaxial cables, much as television broadcast stations transmit RF signals over the air. Just as an analog broadcast television signal occupies 6 MHz of over-the-air spectrum, it occupies 6 MHz of cable spectrum. Until a few years ago, most cable systems in the United States had at most 550 MHz of bandwidth. Because about 54 MHz of cable spectrum cannot be used for downstream communications, a 550 MHz system can accommodate roughly 80 analog video channels. One way of adding to a cable system's channel capacity is to enhance its ability to transmit higher radio frequencies — *i.e.*, frequencies above 550 MHz. Many cable operators, therefore, have recently upgraded their systems to 750 MHz. In 1996, TWC launched a five-year, $4 billion program to upgrade all of its cable systems to at least 550 MHz, with most being upgraded to 750 MHz. That program is virtually complete: 94% of TWC's 13 million subscribers are now served by systems having 750 MHz or more in bandwidth. TWC has no plans for additional bandwidth expansion in the immediate future.

The addition of 200 MHz of bandwidth above 550 MHz does not automatically mean that a cable operator can provide more video channels to all subscribers. Because higher frequencies degrade more quickly than lower frequencies, using the additional 200 MHz for analog signals is not cost effective. Doing so would require more closely spaced amplifiers, which is usually not feasible economically. Moving amplifiers more closely together is not necessary, however, when the higher frequencies are used to transmit digital signals. Cable operators therefore commonly use most of the new bandwidth for digital programming.

Digital transmission brings many additional benefits. For one thing, digital transmission makes for a sharper image and better sound quality. For another thing, digital transmission enables digital compression. As many as a dozen video signals can be transmitted within a single 6 MHz slot, though the number is smaller where quickly changing images are transmitted. (For example, only about six signals carrying sports programming can be compressed into a 6 MHz slot.) Digital transmission also allows a cable operator to provide new and innovative services, including cable-modem service, IP telephony, and video-on-demand.

In the past two or three years, many cable operators have begun offering "digital cable" packages that use the spectrum above 550 MHz. The typical digital cable package available on TWC's systems consists of about 40 additional cable-programming services, about 30 additional premium channels, about 40 channels of CD-quality music, as many as 50 pay-per-view channels of sports and movies, and an interactive electronic programming guide. The subscriber can receive this programming package for a small flat monthly fee on top of the regular (analog cable) subscription fee. (Premium and pay-per-view programming of course cost extra.) These packages have proved very popular with subscribers.

That said, it is commonly accepted within the cable industry that, for the foreseeable future, a sizable number of subscribers will subscribe only to analog programming. Quite apart from the fact that some consumers are unwilling to pay extra for the additional digital programming, many subscribers have cable-ready analog TV sets and are reluctant to switch to a service that requires them to have a set-top box. This is particularly true of subscribers having numerous TV sets: digital cable requires a set-top box for each TV set. Thus, for practical business reasons, TWC will have to continue providing the currently existing analog programming. It is expected that this will continue at least until most TV sets are equipped with the functionality now available only in digital set-top boxes.

Accordingly, for the foreseeable future, upgraded systems will have separate analog and digital programming: analog programming substantially as it has been offered for many years, and digital programming including new services not already available to analog subscribers. Thus, the bottom 550 MHz will still require 6 MHz per video channel, and cable operators cannot "digitize" their entire system overnight. Assertions that, by using digital compression, cable systems could instantly multiply the channel capacity of their entire cable spectrum are therefore unfounded. For the practical reasons set forth above, digital compression cannot be used in the part of the cable spectrum used to transmit analog programming. To the extent digital compression adds to cable operators' channel capacity, it can do so only in the small part of the cable spectrum devoted to digital channels.

Demand for cable spectrum below 550 MHz is very much at a premium. The continually growing number of cable-programming services available in the marketplace far outstrips the number of analog channels available on the typical cable system. On almost all TWC systems, the lower 550 MHz have for some time been "channel-locked": all channels have been filled with analog broadcast signals, PEG and leased-access programming, and cable-programming services that subscribers have come to expect. Carrying digital must-carry signals in the spectrum below 550 MHz would require dropping popular programming. Making room on the analog spectrum by moving signals to the digital spectrum would of course be no answer: unable to receive digital signals, analog-only subscribers would still lose access to familiar programming. Adding digital broadcast signals to the part of the cable spectrum below 550 MHz would thus cause considerable hardship.

Where TWC has begun carrying digital broadcast signals, therefore, it has done so on the part of the cable spectrum above 550 MHz. To view HDTV broadcast signals, subscribers need a special HDTV set-top box, which is different from a regular digital set-top box. A regular digital set-top box can be used to view standard definition ("SDTV") digital programming (as well as analog programming), but not HDTV digital programming. The special HDTV set-top box can be used to view analog programming, SDTV digital programming, and HDTV digital programming. TWC does not require subscribers to subscribe to the digital-cable package to receive an HDTV set-top box.

Compelled carriage of digital broadcast signals in the part of the cable spectrum above 550 MHz would be just as burdensome as compelled carriage below 550 MHz. A digital broadcast signal can be compressed to only a small degree: no more than two digital HDTV broadcast signals can be made to fit a 6 MHz slot of cable spectrum. In fact, in systems where cable operators are required to use the bandwidth-inefficient 8VSB modulation method (rather than 256 QAM), a single broadcast signal can occupy two 6 MHz slots. *See Carriage of Digital Television Broadcast Signals*, First Report and Order and Further Notice of Proposed Rulemaking, CS Docket No. 98-120, FCC 01-22, ¶ 73 n.216 (rel. Jan. 23, 2001) ("*Order*"). Each 6 MHz slot of cable spectrum could otherwise carry multiple compressed digital SDTV services. Thus, requiring carriage of a single digital broadcast signal can come at the expense of a number of SDTV signals.

With this background, the questions in the survey can be answered as follows:

Question 1.

TWC currently serves approximately 12.8 million subscribers, up from 12.7 million at year-end 2000 and 12.6 million at year-end 1999. As stated above, about 94% of TWC's subscribers are already served by systems having at least 750 MHz in bandwidth. In addition, the systems in the New York City division have 860 MHz of bandwidth. About 2% of TWC's subscribers are still served by 550 MHz systems. TWC also still has a few 300 and 450 MHz systems, mostly systems that were recently acquired from other cable operators. Systems with a bandwidth of 450 MHz or less now serve only about 4% of TWC's subscribers — down from 11% at year-end 1999 and 8% at year-end 2000. This percentage is expected to decline to zero as upgrades are completed over the next couple of years.

Question 2.

TWC has systems with bandwidths of 300, 450, 550, 750 and 860 MHz, but the vast majority of TWC's subscribers is now served by 750 MHz systems. In each category of cable system, regardless of the total bandwidth available, the lower 54 MHz cannot be used for downstream transmissions. On systems with bandwidths of 550 MHz or less, all or almost all of the remaining bandwidth (496 MHz) is used to transmit up to approximately 80 channels of analog video. On 750 MHz systems, the lower 550 MHz is usually programmed the same

way as on 550 MHz systems. As for the bandwidth above 550 MHz, it is difficult to indicate with great specificity how it is used. Within certain limits, TWC's local divisions have discretion in programming this spectrum. In addition, the number of available broadcast stations varies across divisions. Thus, spectrum use is somewhat different in every system.

The lower frequencies of the additional 200 MHz above 550 are commonly programmed with additional analog video services. These frequencies are sufficiently low that they do not implicate the amplification problem discussed above. Thus, up to seven or eight of the 6 MHz slots immediately above 550 MHz may be used for additional analog services, including additional cable-programming services, premium services, and pay-per-view channels. These analog services are available to all subscribers, even if they do not have a digital set-top box.

The remainder of the spectrum above 550 MHz is used for digital transmissions, which fall into five categories. *First*, an increasing portion of the spectrum above 550 MHz is used for purposes other than video. TWC systems commonly use two 6 MHz slots to provide cable-modem service. Also, at least a portion of one slot is usually programmed with CD-quality digital music signals: as many as 80 digital music signals can be compressed into a 6 MHz slot. In addition, one 6 MHz slot is commonly used for the transmission of data that control digital set-top boxes. It is expected that, in the future, additional 6 MHz slots may be used for Internet Protocol telephone service. In two systems (Rochester, New York, and Portland, Maine), TWC is conducting technological and marketing trials for this new and innovative service. The systems involved each use one 6 MHz slot for telephony.

Second, some slots are used for HDTV programming, from both broadcasters and cable-programming services. Where 256 QAM is used, each 6 MHz slot can be used to transmit two HDTV signals. Many TWC systems now use two or three 6 MHz slots for this purpose. Usually, these include one slot for HBO and Showtime, and one or two slots for digital broadcast signals. It is expected that the number of slots devoted to HDTV will grow as TWC signs additional retransmission-consent agreements with broadcasters and as non-premium cable-programming services launch HDTV signals.

Third, there are usually a number of additional digital SDTV cable-programming services. At least three or four 6 MHz slots are commonly filled with basic services received from AthenaTV, a digital satellite distribution service like AT&T's Headend-in-the-Sky service. In addition, three or four 6 MHz slots are usually devoted to multiplexed digital SDTV premium channels. For example, one slot may be filled with multiplexed HBO signals, another with multiplexed Showtime signals, and still another partly with Encore and partly with Starz signals. In addition, TWC systems offer various premium sports packages. For example, representative TWC systems program two slots of multiplexed NBA games and a slot of multiplexed NHL games.

Fourth, much of the remaining spectrum is usually devoted to pay-per-view programming. As many as five slots are typically filled with "In Demand" pay-per-view channels, which provide a selection of movies at staggered schedules, with starting times every 15 minutes or so. Three of TWC's divisions (Austin, Hawaii, and Tampa) have recently begun offering video-on-demand, a new and innovative service that allows subscribers to select video programming from a sizable library and view it (as well as pause, forward, and rewind it) in much the same way as video tapes. In the near future, TWC is hoping to introduce this service nationally. Initially, some systems may devote only a few slots to video-on-demand. For example, TWC's Tampa system is devoting four slots to video-on-demand service. Depending on demand, the amount of bandwidth devoted to video-on-demand service is expected to grow. For example, TWC's Austin system is already devoting 10 slots to video-on-demand service.

Some TWC systems still have a few empty 6 MHz slots in the cable spectrum above 550 MHz, but it is expected that those slots will be used for the purposes identified above as consumer demand warrants. Because only two HDTV signals can be fitted into a single 6 MHz slot, a large amount of spectrum is expected to be consumed by additional HDTV signals of cable-programming services. In addition, as demand increases, additional spectrum will be required for IP telephony and for cable-modem service (including use by multiple competing Internet Service Providers). And, as already mentioned, video-on-demand is expected to consume whatever bandwidth may remain.

Question 3.

In many of TWC's 750 MHz systems, about 150 MHz is used for digital transmission (200 MHz minus the seven or eight lower-frequency 6 MHz slots that are being used for analog video signals). The modulation techniques in use are both 64 and 256 QAM. The specific modulation technique used depends on the programming involved, as different kinds of digital programming are received in different formats. AthenaTV programming is received and transmitted in 256 QAM, as are most premium channels. Some pay-per-view channels (In Demand and sports packages) are received and retransmitted in 64 QAM. Data channels (such as those used for cable-modem service) sometimes also use 64 QAM. For HDTV programming (both broadcast signals and premium cable-programming services), the modulation technique used is almost always 256 QAM. This is different in only a few systems, where digital broadcast signals are retransmitted in 8VSB. Use of 8VSB, however, is a stop-gap measure that is expected to be changed to 256 QAM in short order.

Increasingly in TWC's 750 MHz systems, two or three 6 MHz slots are being used to provide HDTV programming — say, one slot shared by HBO and Showtime and one or two other slots each shared by two broadcast signals. It is expected that, in representative 750 MHz systems, the number of HDTV slots will increase in the next few years, as more HDTV cable-programming services become available, more broadcasters begin broadcasting in digital format, and more digital retransmission-consent agreements are signed. For example, based

solely on agreements that TWC has already signed, TWC's Manhattan and Los Angeles systems are each expected to carry seven digital broadcast signals by the end of next year. Additional retransmission-consent agreements will only add to the number of slots used for digital broadcast signals.

Question 4.

As the Commission has noted, TWC "has digital carriage arrangements with all four major networks, some network affiliate owners, as well as a group of public broadcasters." *Order* ¶ 129 (footnote omitted). The first of these arrangements, with CBS, dates back to late 1998. In 1999, TWC signed a similar agreement with Fox. In 2000, TWC signed agreements with both ABC and NBC. Also in 2000, TWC entered into a master agreement with the Public Broadcasting Service (PBS) and the Association of America's Public Television Stations (APTS). Finally, also last year, TWC reached agreements with the Hearst-Argyle and Belo groups. Many of these agreements cover only owned-and-operated stations. The agreements with CBS and ABC, however, allow non-network-owned affiliates to "opt in" to the agreement's carriage terms. Similarly, under the PBS agreement, the digital signals of more than 100 public television stations are eligible for carriage on TWC's cable systems. In total, more than 200 commercial and public stations have now made carriage arrangements with TWC.

Under each of the retransmission-consent agreements described above, TWC will carry digital broadcast signals only on systems having a bandwidth of 750 MHz or greater. As already explained, however, that description currently covers almost all TWC systems. Each of the agreements covers all TWC systems in the relevant DMAs: no TWC systems are excluded. Each of these agreements further contemplates that TWC will retransmit signals in whatever format received, whether it be 1080i, 720p, 480p, or some other format, and whether it be a single HDTV stream or multiple SDTV streams. The agreements leave TWC free to determine the modulation format (256 QAM, 64 QAM, or 8VSB), but, as already discussed, almost all systems are using or are expected to use 256 QAM. The agreements also leave TWC free to decide on what portion of the cable spectrum to carry the digital signal in question. As already discussed, digital signals are usually carried or are expected to be carried in the portion of the cable spectrum above 600 MHz.

Many of the digital broadcast stations covered by TWC's digital retransmission-consent agreements are not yet on the air: most are not expected to sign on until the end of next year. Nevertheless, TWC is already carrying a number of digital broadcast signals. For example, TWC systems are carrying four digital signals in Houston and Raleigh, three in Los Angeles, and two each in Charlotte, Detroit, Minneapolis, and Philadelphia. These numbers are expected to grow quickly as more stations sign on the air.